# TREK

# COMMAND

# USER GUIDE


**July 2019**

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# 1 Welcome

The Telescience Resource Kit (TReK) is a suite of software applications and libraries that can be used to monitor and control assets in space or on the ground.

The TReK Command application provides the capability to update, send, and track commands. Includes support for various types of command destinations including POIC, Suitcase Simulator, PRCU, RAPTR, and UFO. It also includes the command bridge capability.

## 1.1 Getting Started

Start with the Introduction which provides an application overview. Next, try the Quick Start Guides for "How Tos" for common functions. For help with details, reference the Details section. See the FAQ and Troubleshooting section for helpful hints and solutions to the common "gotchas".

# 2 Technical Support

If you are having trouble installing the TReK software or using any of the TReK software, please contact us for technical assistance:

TReK Help Desk E-Mail, Phone & Fax:

E-Mail: trek.help@nasa.gov
Telephone: 256-544-3521 (8:00 a.m. - 4:00 p.m. Central Time)
Fax: 256-544-9353

If you call the TReK Help Desk and you get a recording please leave a message and someone will return your call. E-mail is the preferred contact method for help. The e-mail message is automatically forwarded to the TReK developers and helps cut the response time. The HOSC Help Desk (256-544-5066) can provide assistance as needed and is available 24x7.

# 3 Introduction

The TReK Command application provides the capability to update, send, and track commands. It includes support for various types of command destinations including POIC, Suitcase Simulator, PRCU, RAPTR, and UFO. It also includes the command bridge capability.

# 4 Overview of the User Interface

## 4.1 Main Window

The main window contains several areas as shown in Figure 1. The Command Track and Message Area are dock windows that you can float or dock. To float a dock window, use your left mouse button to click and hold the title area while dragging the window to another area of the screen. To dock, use the title bar to drag the dock window over the main window and drop.

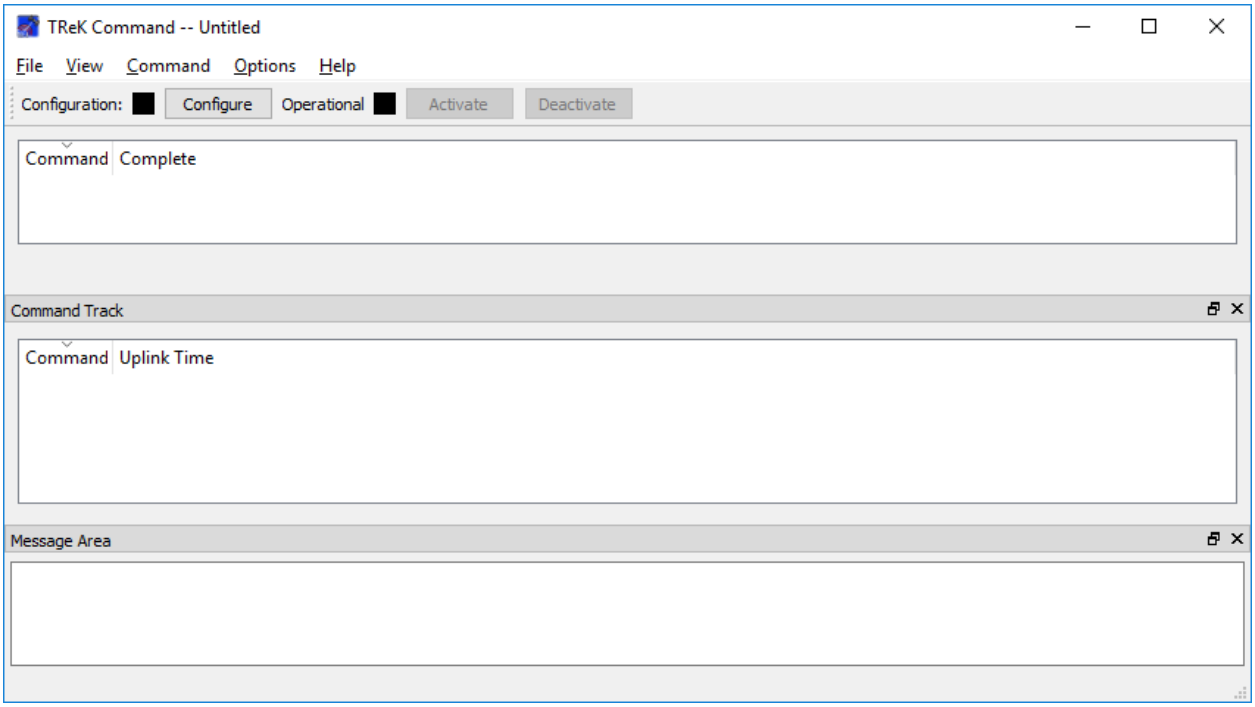


**Figure 1 Main Window**

Toolbar

The toolbar at the top of the window provides quick access to configure the application and start and stop the command service.

POIC Command Status and Configuration Toolbar

The POIC Command Status and Configuration toolbar (located under the Configuration toolbar) provides quick access to POIC Command Status and Configuration information. This toolbar is only available when a POIC destination is active.

Command

The Command area will display a list of commands when the command service is active. It will also display convenience buttons to perform functions such as updating a command or sending a command.

Command Track

The Command Track area displays the history of commands sent.

Message Area
The Message Area displays important status and error messages. The message area can be cleared using the View menu.

## 4.2 Toolbar

The toolbar provides visual information about the state of the application and provides access to common application functions.

Configuration Status
When the Configuration status is black, this indicates the application has not been configured. When the Configuration status is green, this indicates the application has been configured and the command service can be activated.

Use the Configure button to access the Configure dialog to configure the application.

Operational Status
When the Operational status is black, this indicates the command service is inactive. When the Operational status is green, this indicates the command service is active and tasks such as sending a command can be executed. The application must be properly configured before the Activate button will be available. The command service must be active before the Deactivate button will be available.

Use the Activate button to activate the command service. This will initiate all internal activities needed to support commanding tasks. When you activate the command service, you will see activation status messages in the main window message area. If you need to reconfigure the command application, deactivate the command service, and then push the Configure button to reconfigure.

### 4.2.1 POIC Command Status and Configuration Toolbar

The POIC Command Status and Configuration toolbar is shown in Figure 2. This Toolbar will only be available when the Command service is Active and the Destination Type is POIC.

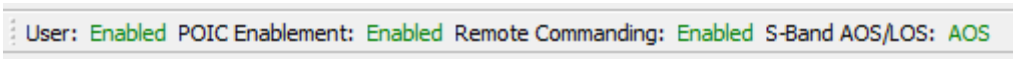


**Figure 2 POIC Command Status and Configuration Toolbar**

## 4.3 Menus

The Command application menus are: File, View, Command, Options, and Help. Each of these menus is described in more detail below.

File Menu
The File menu provides the capability to manage configurations and exit the application.

View Menu
The View menu provides the capability to clear the main window message area and show and hide different areas in the main window.

Command Menu
The Command menu provides the capability to configure the application, activate and deactivate the command service. It also provides access to functions such as updating a command, sending a command, viewing command communication messages, and viewing command track information. The Command menu is context sensitive and will display additional items based on the Command Destination Type. As shown in Figure 3, additional menu items are displayed when the Command Destination Type is a POIC destination.

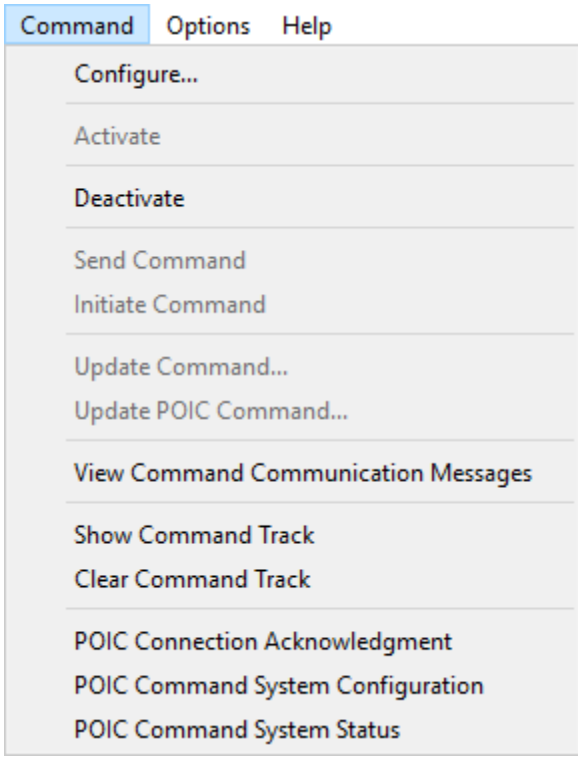


**Figure 3 Command Menu**

Options Menu
The Options menu provides access to the Messages dialog, the Command Preferences dialog, and the Advanced Settings dialog. The Messages dialog displays application messages. The Command Preferences dialog provides the capability to configure preferences such as the Command Confirmation Prompt. The Advanced Settings dialog provides access to advanced settings.

Help Menu
The Help menu provides access to on-line help and application version information.

# 5 Quick Start Guides

This section provides "How Tos" for common functions.

## 5.1 How to Configure the Command Application

The following steps describe the minimum necessary to configure the application. For additional information and details about the Configure dialog please reference section 6.1.

1. Push the Configure button to display the Configure dialog.
2. On the General tab enter the Destination Name and Destination Type. If the Destination Type is POIC, enter the HOSC Login Name. Fill in the Communication Settings.

   Note: If you are connecting to the HOSC, enter the Office Mode IP Address returned by the HOSC VPN client in the Local IP Address field. If you are using Ku IP Services enter the Ground Proxy IP Address for the Destination IP Address.

3. On the Command tab, add one or more commands to the Command list.
4. Optional: On the History tab, select the Yes radio button if you would like the application to write command history information. Fill in the Directory. It will default to the command_history directory in the trek_workspace directory.
5. Push the OK button to save the configuration information and exit the dialog.

If the application is configured correctly, the Configuration status will be green.

## 5.2 How to Send a Command

The following steps describe the minimum necessary to send a command once the Command service is active.

1. Select a command in the Main Window Command List.
2. Push the Send button located under the Main Window Command List.

Note: If the Command Send is successful, you will see the results in the Main Window Command Track Area. If an error occurs you will see an error message.

## 5.3 How to Update a Command

The following steps describe the minimum necessary to update a command once the Command service is active.

1. Select a command in the Main Window Command List.
2. Push the Update button located under the Main Window Command List.
3. In the Command Update dialog, modify the command as needed.
4. Push the OK button to save the updates and exit the dialog.

### 5.4 How to Start and Stop the Command Service

This section describes how to start and stop the Command service.

1. Before the Command service can be started, you must configure the application. To learn more about this see section 5.1. The Configure status must be green before you can start the Command service.
2. To start the Command service, push the Activate button on the toolbar. If this is successful the Operational status will turn green. When the Operational status is green you can start commanding.
3. To stop the Command service, push the Deactivate button.
4. When activating or deactivating important status and/or error messages will be displayed in the Main Window message area.

## 6 Details

This section covers various application details.

### 6.1 Configuration

The Configure dialog provides the capability to configure the command service. Each tab is described below. The Command configuration can only be modified when the Command service is inactive.

#### 6.1.1 General Tab

The General tab is shown in Figure 4. Each field is described below.

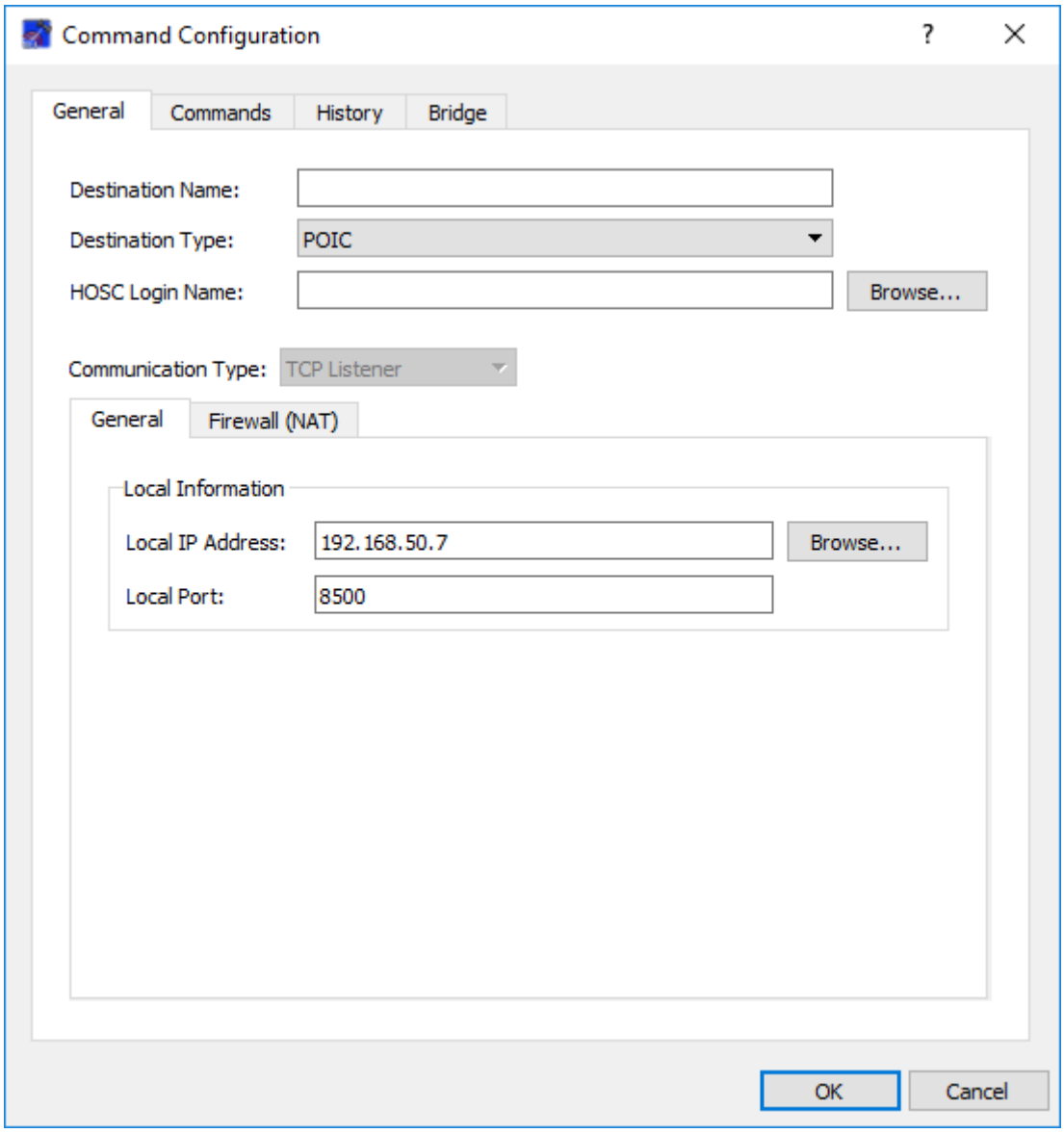


**Figure 4 Command Configuration Dialog (General Tab)**

Destination Name

This field should contain a user defined name for the destination.

Destination Type

The Command application provides the capability to communicate with different types of command destinations. The Destination Type identifies the type of Destination. Destination Types include POIC, PRCU, RAPTR, SCS, and UFO. The POIC, PRCU, RAPTR, and SCS destination types require a specific communication type. When you select the Destination Type, the Communication Type menu will automatically be configured to the correct setting for the Destination Type. The UFO destination is an "Unidentified Destination" meaning the TReK software has no knowledge about the

destination. Therefore, you must set the Communication Type to the correct setting based on the interface supported by the destination.

HOSC Login Name

This field is only required for a POIC Destination. It should contain the name of an active HOSC Login Session that was created using the TReK HOSC Login application. The Browse button can be used to view and select a HOSC Login Name.

Communication Settings Area

The Communication Settings area changes depending on the Communication Type setting. For a POIC Destination, the Communication Type is automatically set to **TCP Listener** as shown in Figure 5. For the PRCU, RAPTR, SCS destination types, the Communication Type is set to **TCP Client** as shown in Figure 6. When working with a UFO destination, the following communication types are available: **UDP**, **TCP Listener**, and **TCP Client**. The **UDP** communication type is shown in Figure 7.

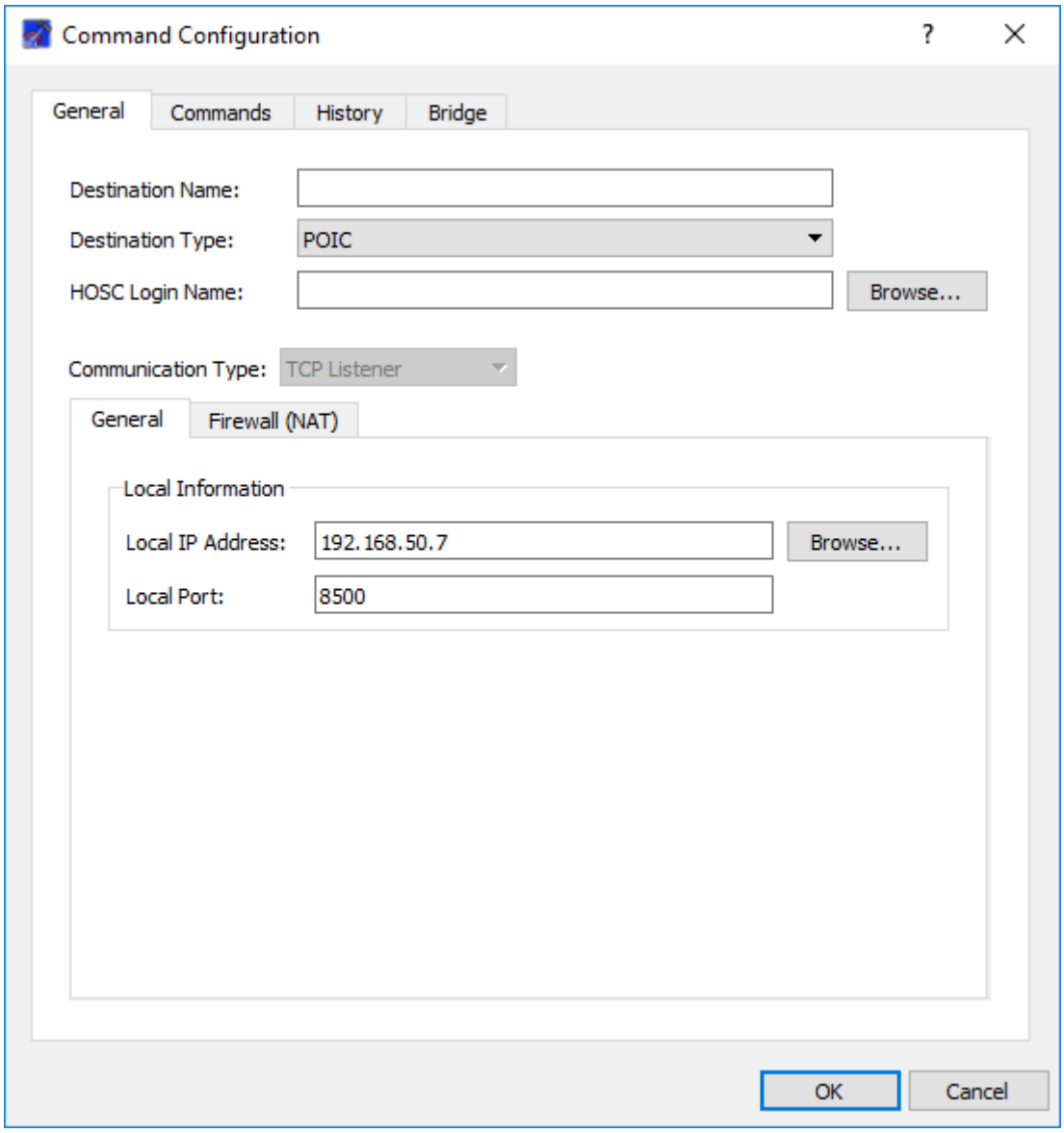


**Figure 5 TCP Listener Communication Type**

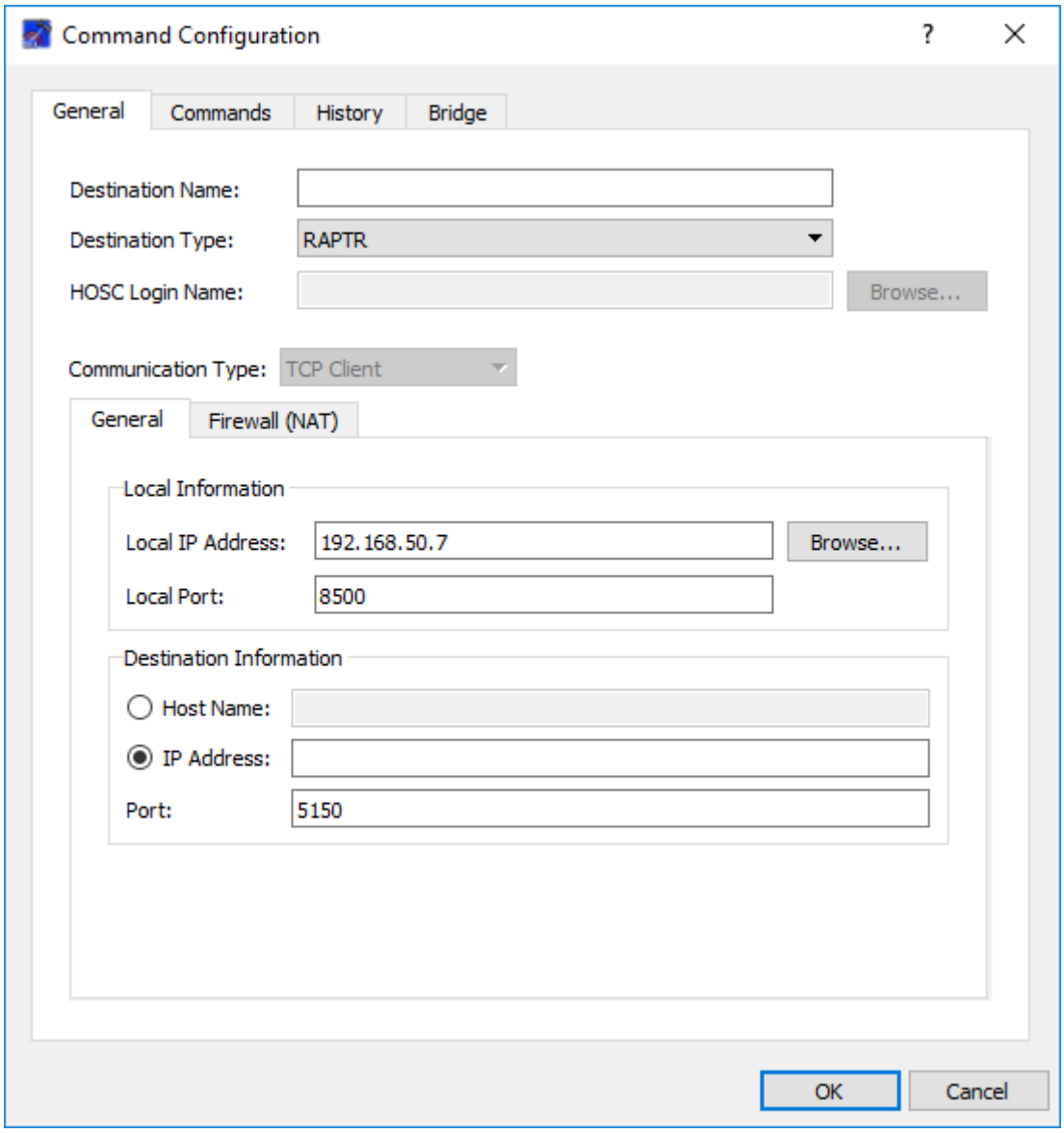


**Figure 6 TCP Client Communication Type**

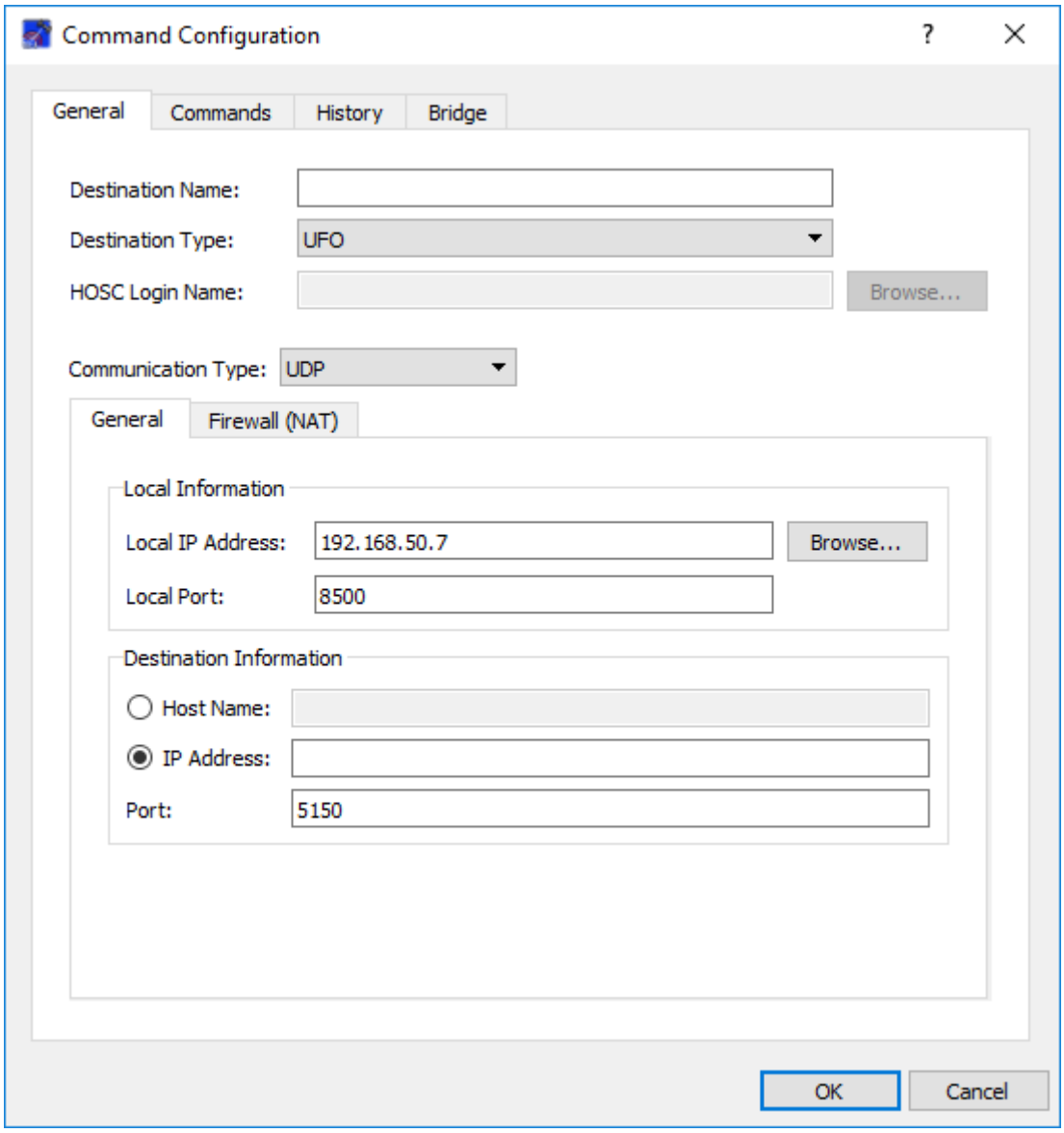


**Figure 7 UDP Communication Type**

Each of the fields used to define the communication settings are described below:

Local IP Address
A socket is created to send and receive command information. This is the local IP address used for the socket.

Local Port
A socket is created to send and receive command information. This is the local port used for the socket. If the communication type is TCP Client or UDP, you can use 0 for the port and an available port will be selected for you.

Destination Information

Destination information fields include the Destination Host Name, Destination IP Address, and Destination Port.

Note: If you are connecting to the Destination, enter the Destination Host Name or IP Address and the Destination Port. If you are connecting to a TReK training tool that is simulating the Destination, enter the IP Address and Port corresponding to the configuration of the training tool. For example, if you are running the training tool on the same computer as the TReK Command application, then you would use your local IP address for the Local IP Address and the Destination IP Address.

Firewall Information

If your computer is behind a firewall, and you need support for Network Address Translation, you can enter the information on the Firewall tab. The Firewall tab is shown in Figure 8.

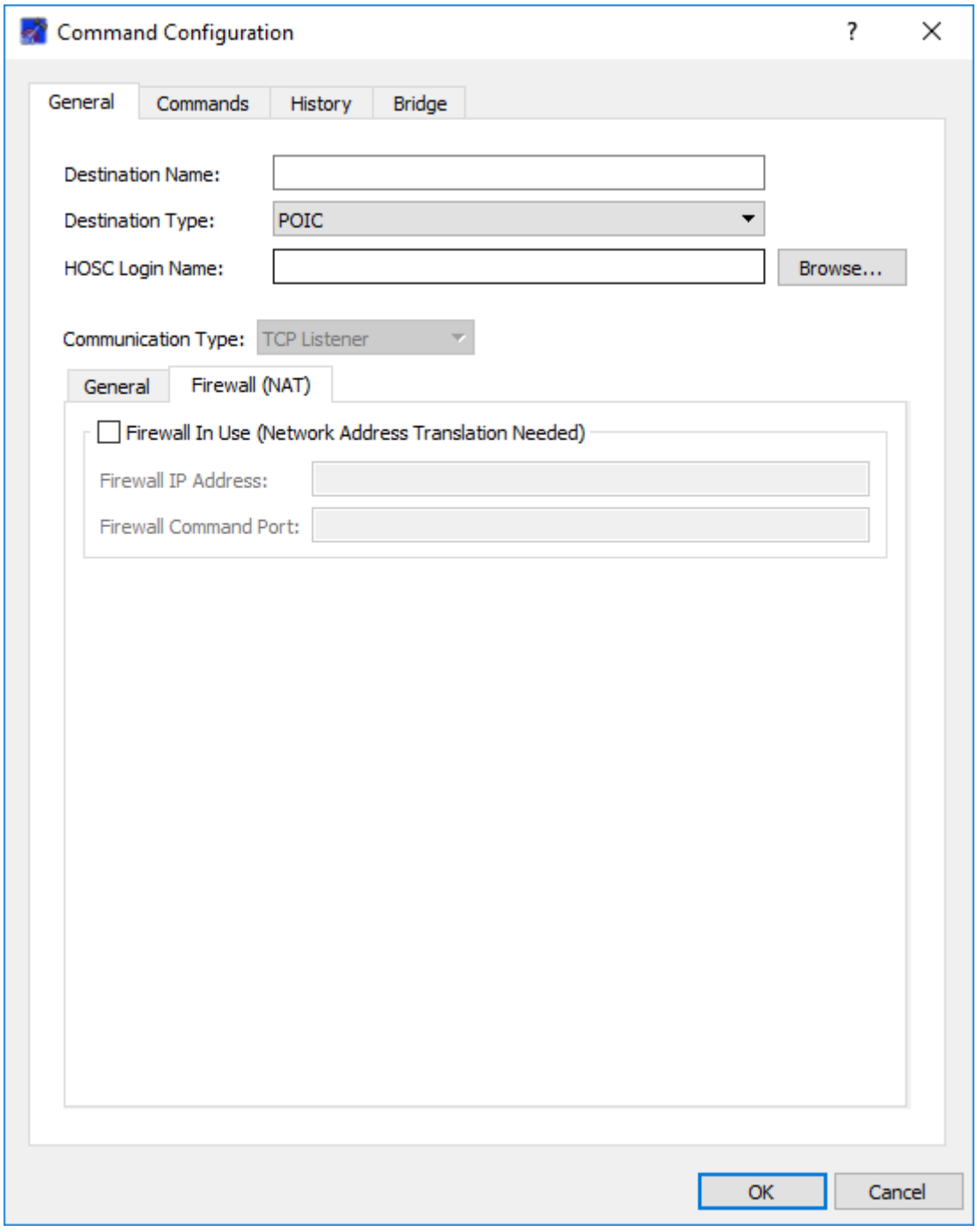


**Figure 8 Command Communication General Tab Firewall Information**

Each field is described below.

Firewall In Use (Network Address Translation Needed)
Check the "Firewall In Use" checkbox, if your location is using a Firewall with network address translation.

Firewall IP Address
The Firewall IP Address.

Firewall HPEG Port
The Port on the Firewall that should be used for network traffic.

### 6.1.2 Command Tab

The Command tab is shown in Figure 9. The Command tab is used to identify a set of commands that can be sent to the destination.

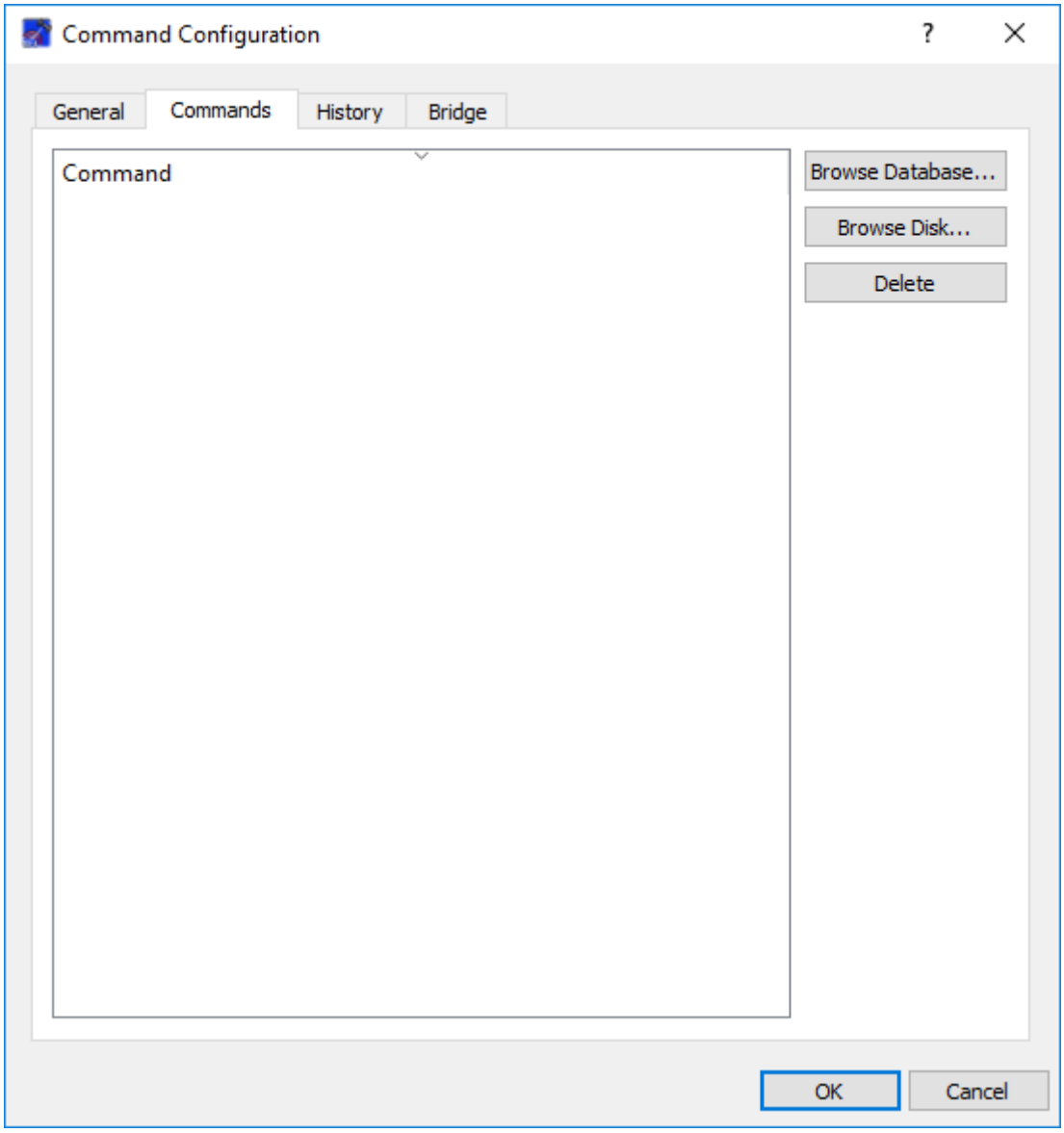


**Figure 9 Command Configuration (Command Tab)**

Each field and button is described below.

Command
The Command list is used to identify the set of commands that can be sent to the destination.

Browse Database
The Browse Database button is used to browse and select commands from a TReK Command Database.

Browse Disk
The Browse Disk button is used to browse and select a command defined in a TReK metadata file (Packet file).

Delete
The Delete button is used to delete a command from the list.

### 6.1.3 History Tab

The History tab is shown in Figure 10. The History tab is used to enable the Command History capability. Enabling the Command History capability will record information about each command sent including the name of the command, the content of the command, and the time the command was sent.

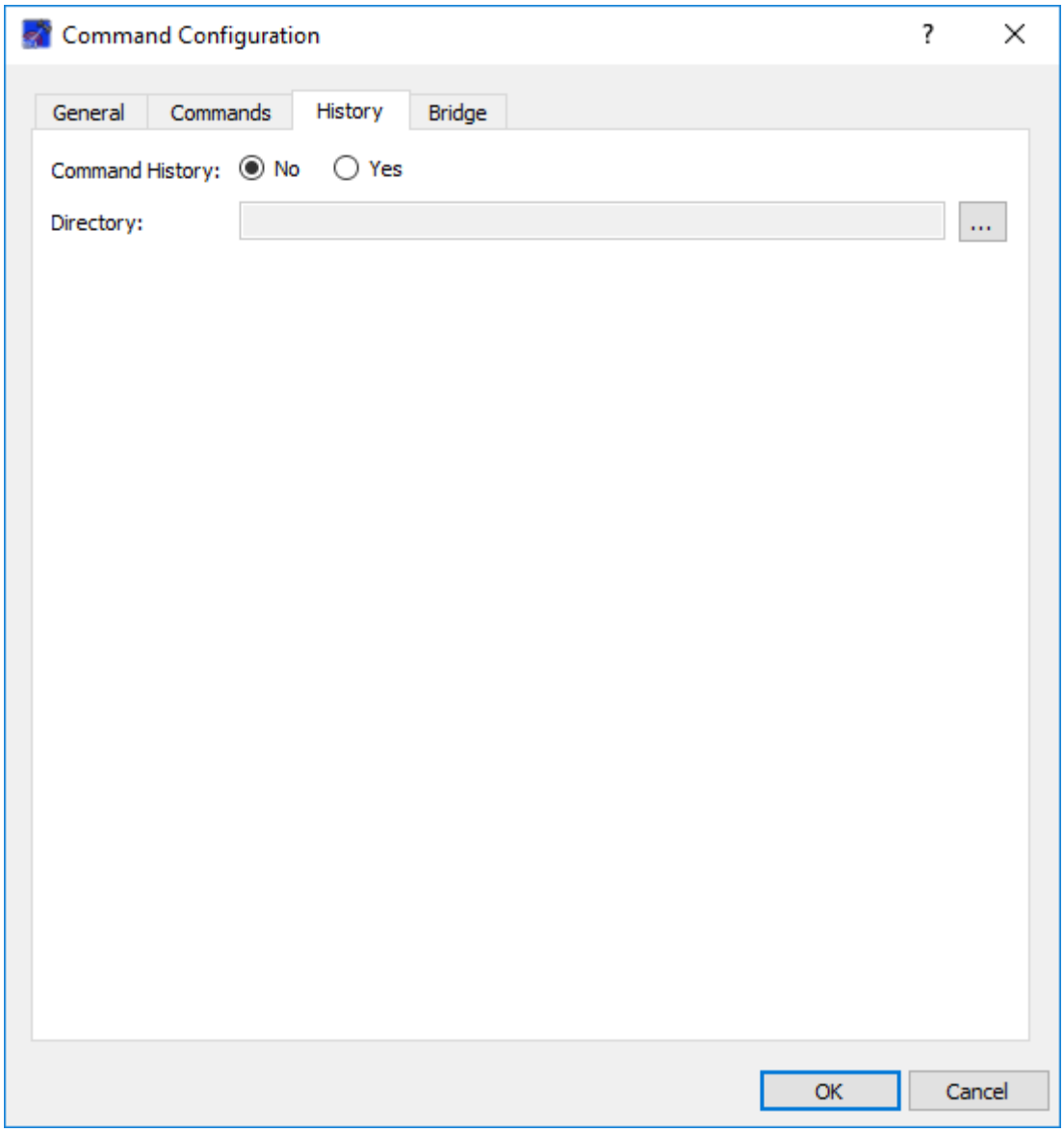


**Figure 10 Command Configuration (History Tab)**

Each field is described below.

Command History
The No and Yes radio buttons disable or enable the Command History capability.

Directory
The Directory is used to identify the directory where the command history information should be recorded. This will default to the trek_workspace command_history directory.

### 6.1.4 Bridge Tab

The Bridge tab is shown in Figure 10. The Bridge tab provides the capability to enable the Command Bridge capability. The Command Bridge capability provides a way to define a socket to receive an incoming command and redirect it to the Destination you configured on the General tab. This provides a way to configure this application as a "central hub" for commanding activities.

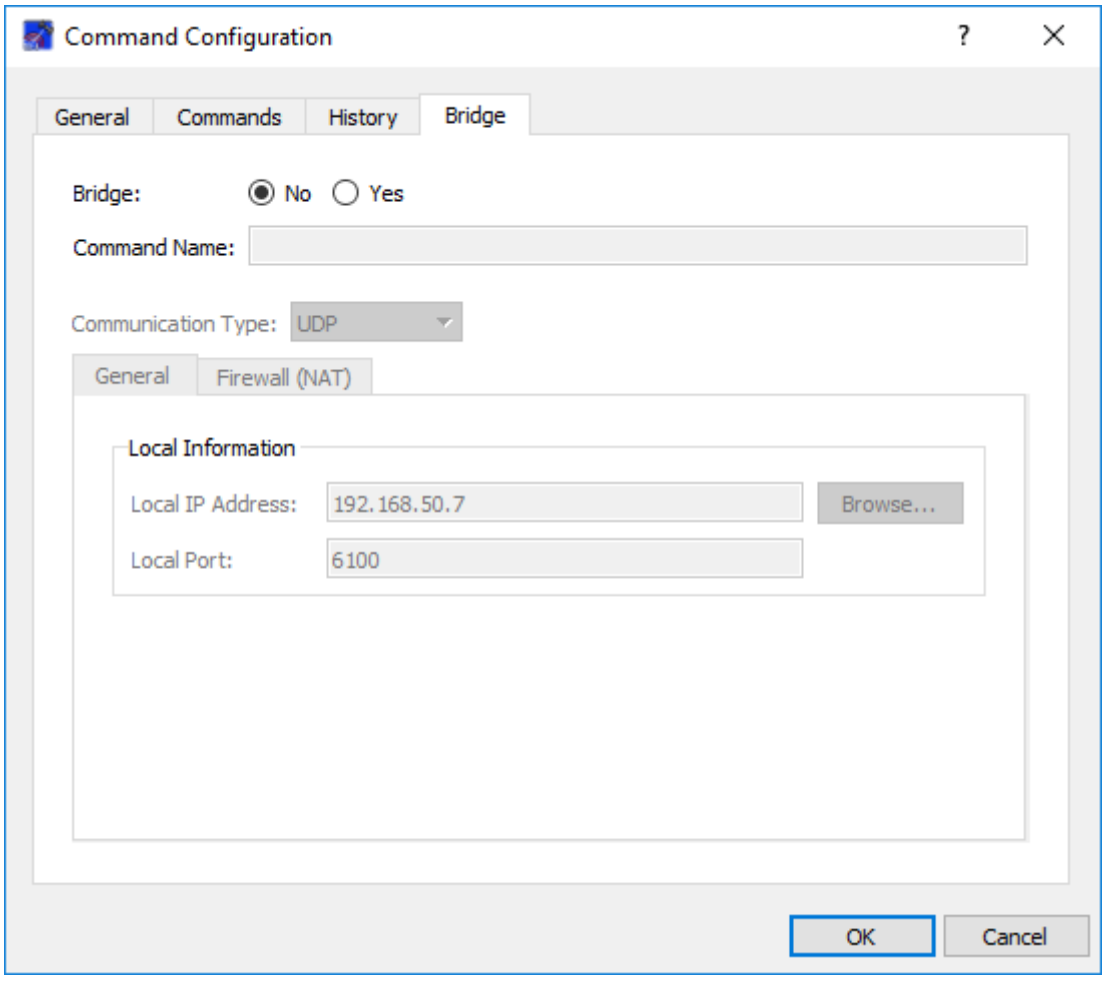


**Figure 11 Command Configuration (Bridge Tab)**

Each field is described below.

Bridge

The No and Yes radio buttons disable or enable the Bridge capability.

Command Name

The Command Name is used to identify the name that will be used when the command is sent to the destination.

Communication Settings Area

The Communication Settings area is used to define the type of socket to use for the bridge. The following communication types are available: **UDP**, **TCP Listener**, and **TCP Client**. Each of the fields used to define the communication settings are described below:

Local IP Address

A socket is created to receive the incoming command. This is the local IP address used for the socket.

Local Port

A socket is created to receive the incoming command. This is the local port used for the socket.

Destination Information

Destination information fields, as shown in Figure 12 include the Destination Host Name, Destination IP Address, and Destination Port.

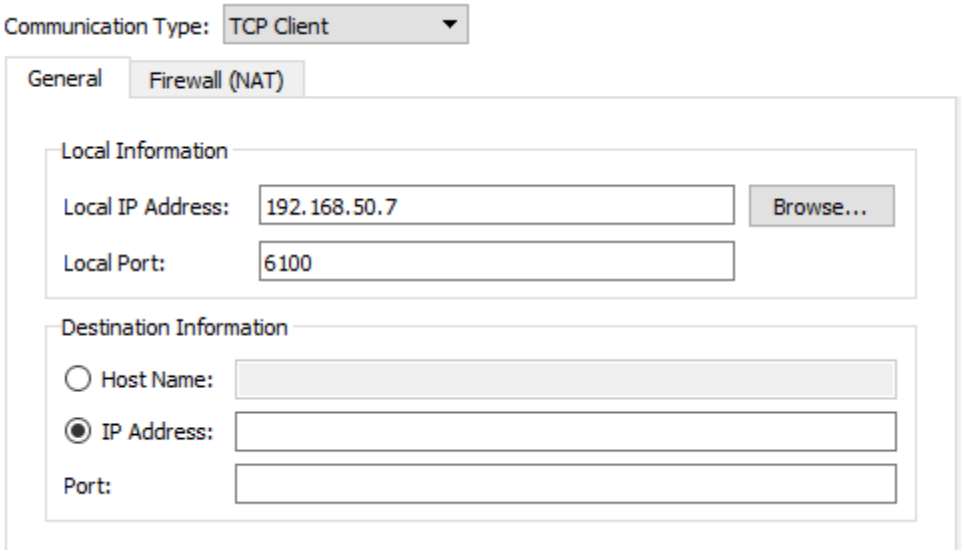


**Figure 12 Bridge Communication Destination Information**

Firewall Information

The Firewall tab is shown in Figure 13. Each field is described below.

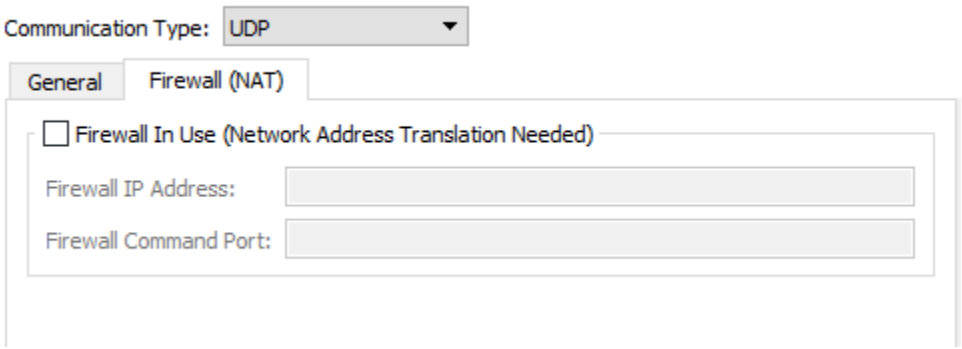


**Figure 13 Bridge Communication Firewall Information**

Firewall In Use (Network Address Translation Needed)
Check the "Firewall In Use" checkbox, if your location is using a Firewall with network address translation.

Firewall IP Address
The Firewall IP Address.

Firewall Command Port
The Port on the Firewall that should be used for network traffic.

## 6.2 Command Area

The Command Area is shown in Figure 14.

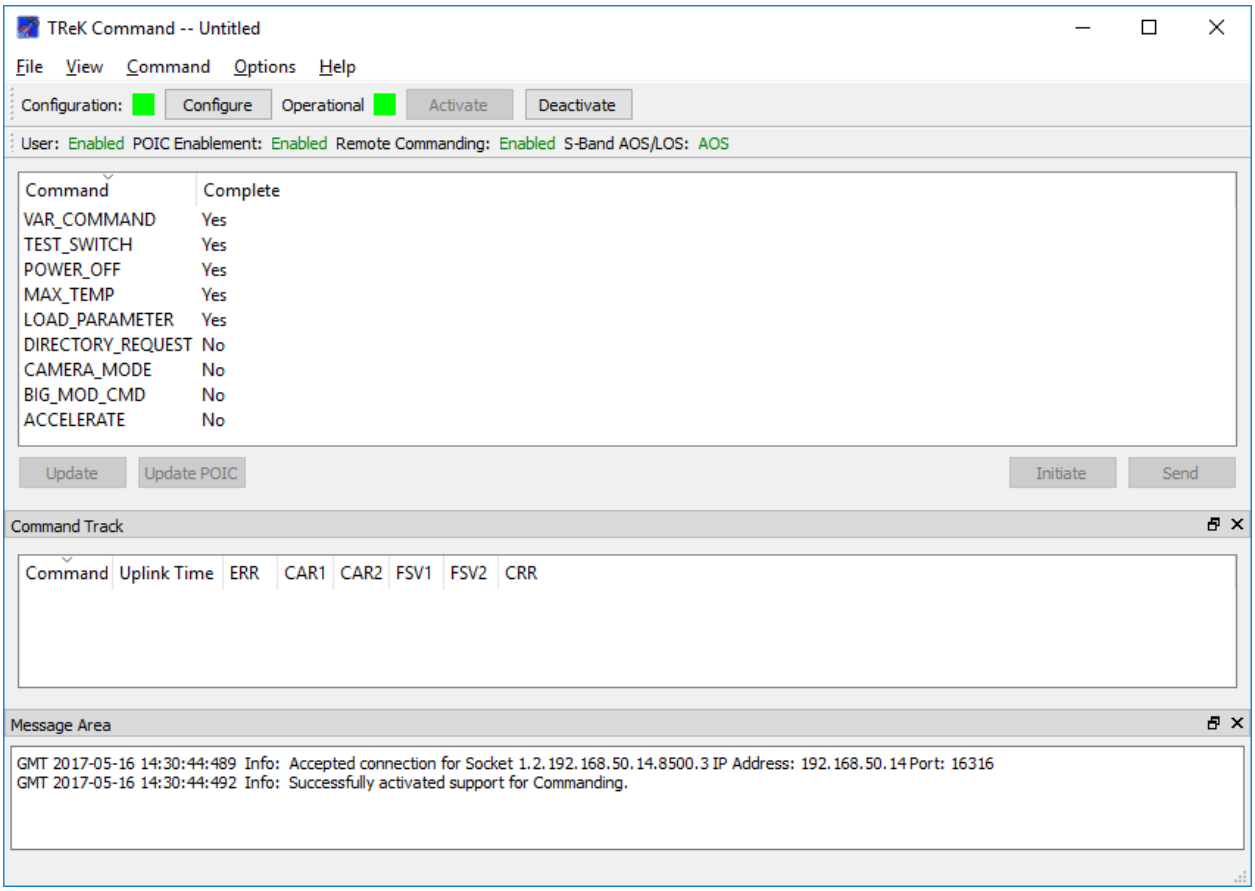


**Figure 14 Command Area Populated with Commands**

When the Command service is activated, any commands defined in the Command Configuration are added to the Command Area in the Main Window. Applicable Command buttons are also displayed. The Command buttons will be disabled until a command is selected. The Command buttons are described below:

Update

The Update button is used to update the contents of a local command. The Update Command dialog will be populated with information about the command selected using the metadata identified when the command service was configured (TReK metadata file or a local TReK command database) and the contents from the last command update performed. The Update Command dialog is used to modify the contents of modifiable command fields.

Update POIC

The Update POIC button is only available when the destination type is POIC. When you push the Update POIC button, TReK submits a request to the POIC to update the contents of the command in the POIC database with the contents of the command data stored locally (the last update you made to the command contents).

Initiate

The Initiate option is only available for a command that is associated with a POIC destination. When you push the Initiate button, a request is sent to the POIC to build the command using the command data stored in the POIC database and then uplink the command. TReK only sends the command name to the POIC since the POIC will get all the information on how to build the command from the POIC database.

Note: The POIC calls this type of command request a remotely initiated command request.

Send

The Send button is used to send a command. TReK uses the command data stored locally (the last update you made to the command contents) to build the command uplink pattern and then send the uplink pattern to the destination.

Note: In the case of a POIC destination, the POIC calls this type of command request a remotely generated command request.

### 6.3 Update Command Dialog

The Update Command Dialog is shown in Figure 15. This dialog is used to modify the contents of the command. The only items that can be changed are the values of modifiable fields.

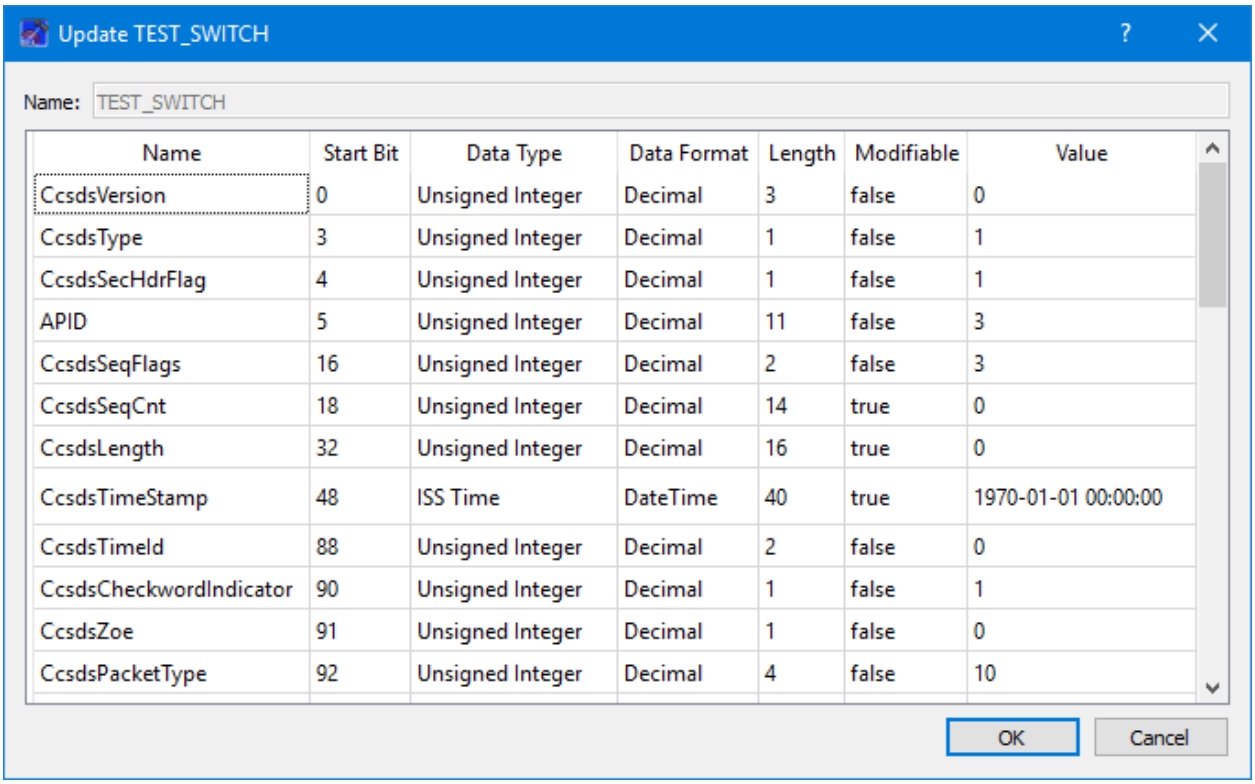


**Figure 15 Update Command Dialog**

## 6.4 Command Track Area

The Command Track Area is shown in Figure 16.

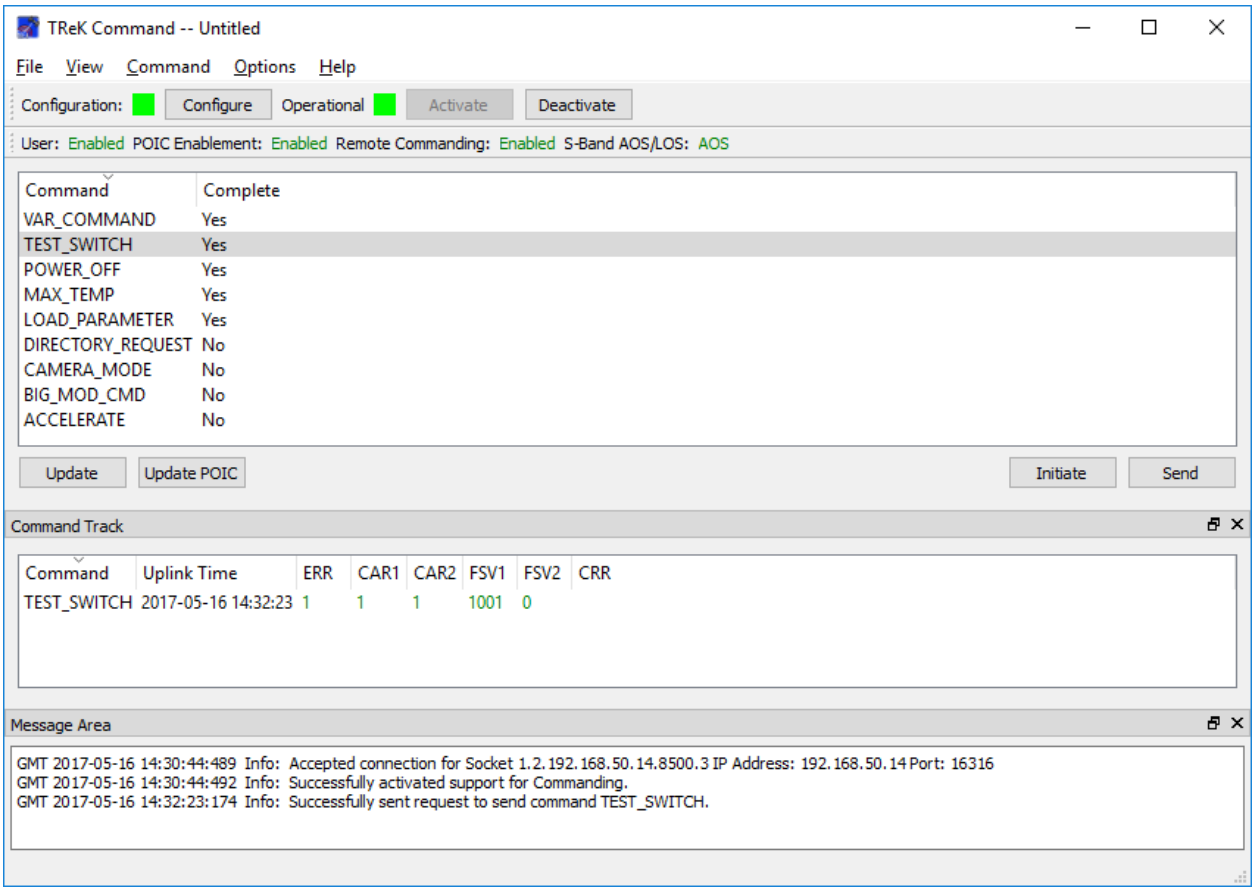


**Figure 16 Command Track Area**

When the Command service is activate, any commands sent are listed in the Command Track Area in the Main Window. The Command Track Area columns are described below.

Command

The Command column displays the name of the command sent.

Uplink Time

The Uplink Time column displays the time the command was sent.

Command Response Columns

Command Response columns will be displayed if the Destination supports command responses. For a POIC Destination, command response columns are displayed. For the

International Space Station (ISS) command response types include: ERR, CAR1, CAR2, FSV1, FSV2, and CRR.

If command responses are supported, the command response will be color coded to indicate success (green) or failure (red). It is possible to retrieve additional information about a command response by double clicking on the item in the Command Track list. This will display a dialog similar to the one shown in Figure 17.

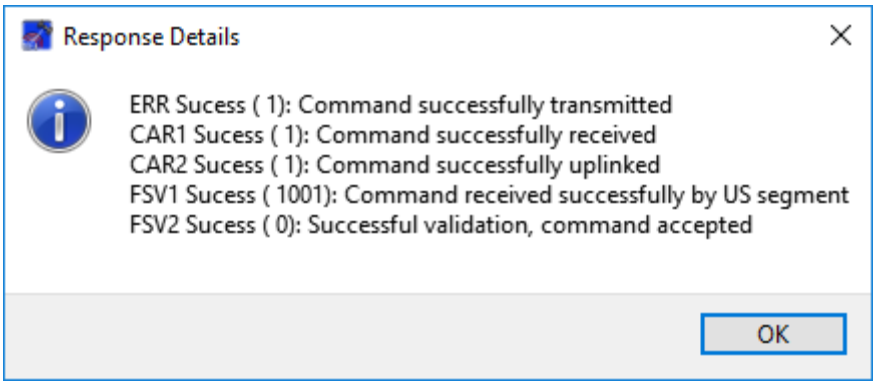


**Figure 17 Command Response Details**

For Destination Types that don't support command responses, there are no additional columns that will be displayed. Figure 18 shows the Command Track Area configured for a UFO destination type.

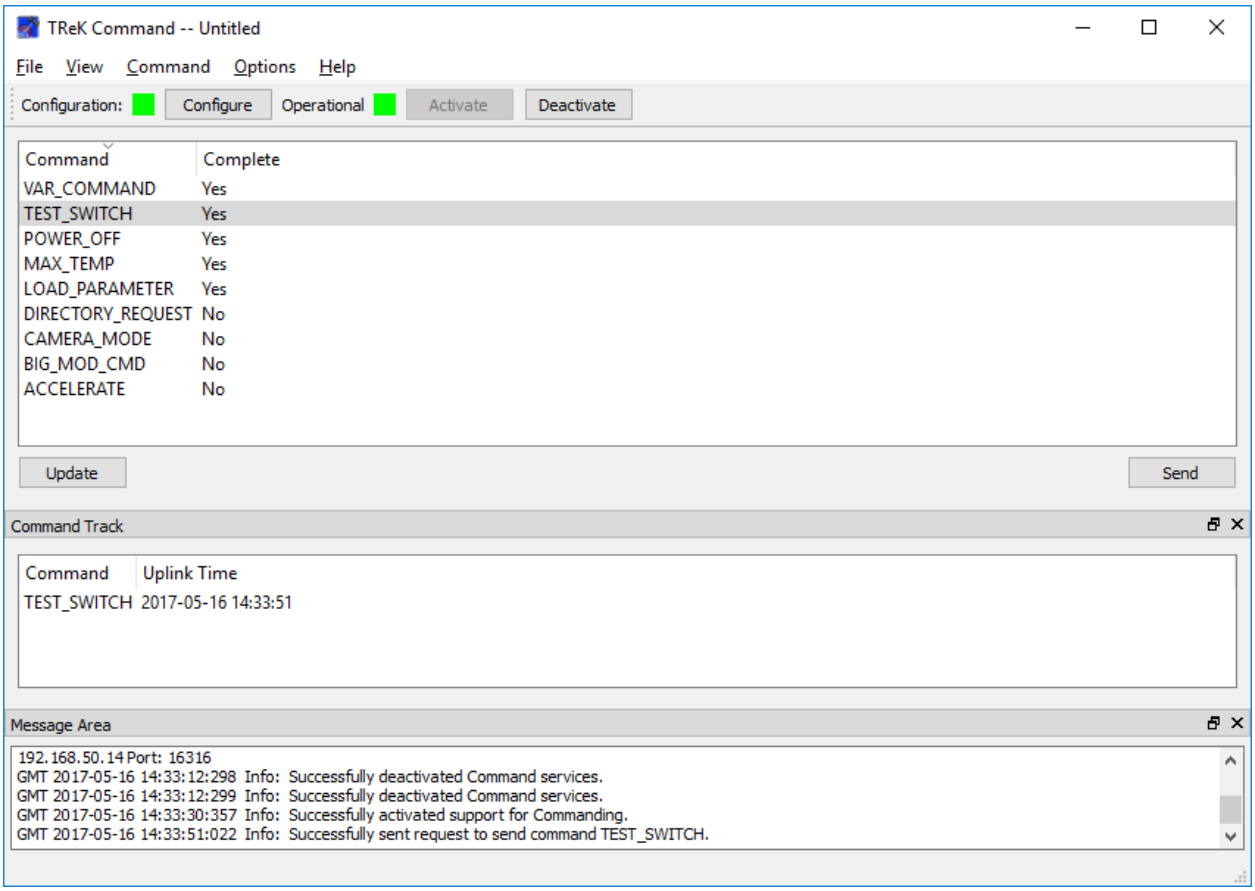


**Figure 18 Command Track Area Configured for a UFO Destination**

Double clicking on a command track item in this configuration will yield the dialog shown in Figure 19 since there are no response details available.

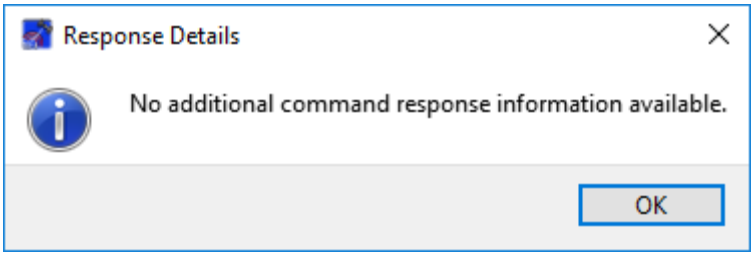


**Figure 19 Response Details Message**

Command Track Dialog

The Command Track dialog is shown in Figure 20. The Command Track dialog displays the same information that is displayed in the Main Window Command Track area. Please reference section 6.4 for details.

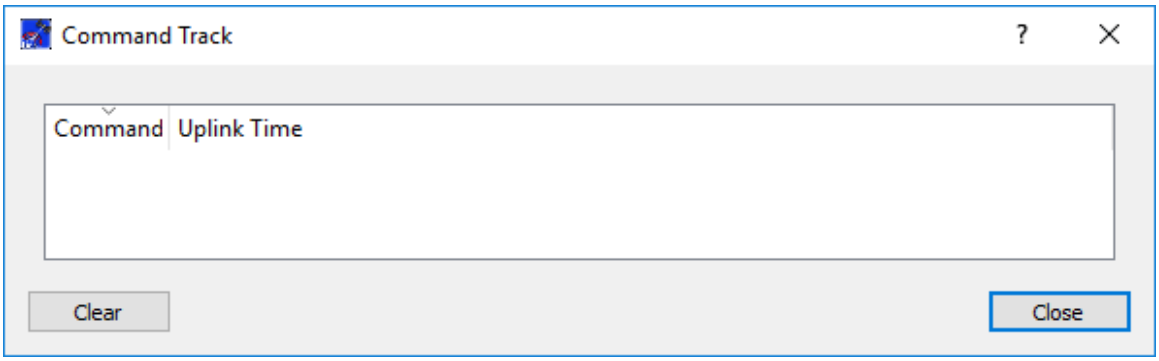


**Figure 20 Command Track Dialog**

Clear

The Clear button will clear all command track information in all views (Command Track in the Main Window and the Command Track dialog).

## 6.5 Command Communication Dialog

The Command Communication dialog is shown in Figure 21. This dialog is used to view the communication with the command destination. Information is displayed in a text/hexadecimal format.

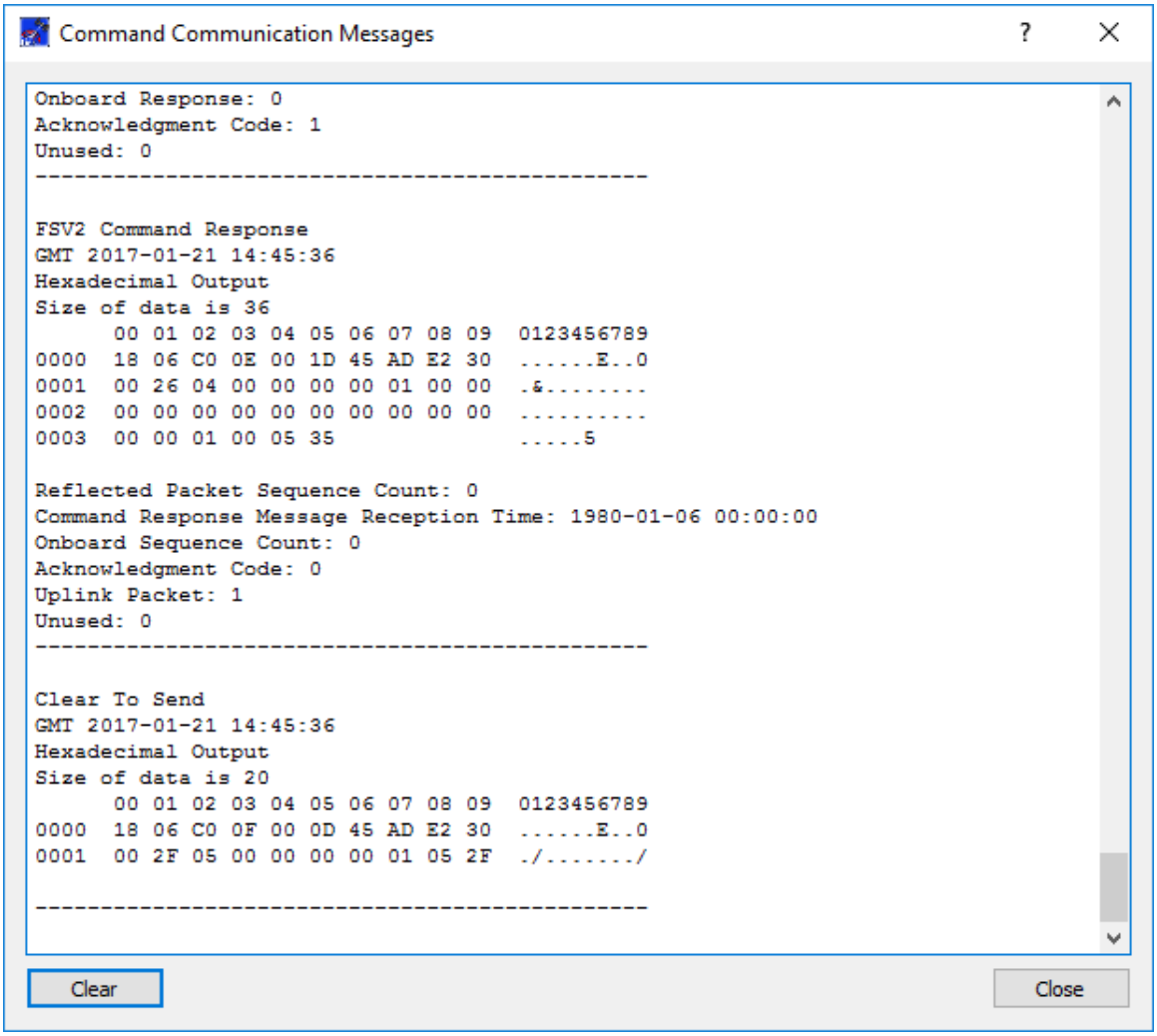


**Figure 21 Command Communication Dialog**

## 6.6 Command Preferences Dialog

The Command Preferences dialog is shown in Figure 22. This dialog is used to configure command preferences.

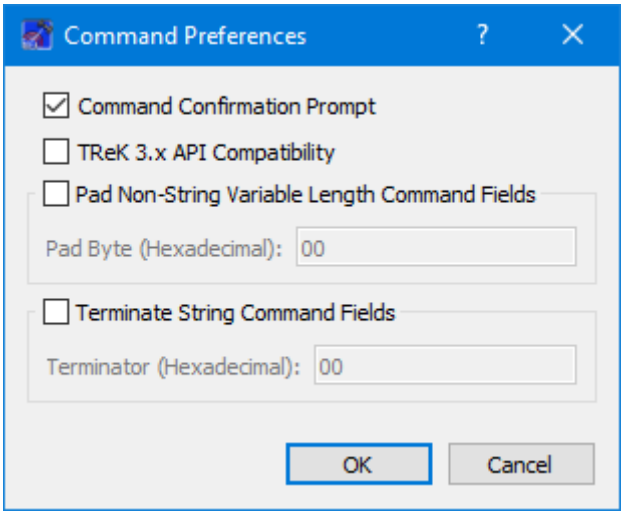


**Figure 22 Command Preferences Dialog**

Each field is described below.

Command Confirmation Prompt

If the Command Confirmation Prompt checkbox is checked, a dialog will be displayed asking for confirmation to proceed each time an Initiate or Send action is requested.

TReK 3.x API Compatibility

The TReK 3.x API Compatibility checkbox can be used to set a flag to allow TReK to behave the same as TReK 3.x with respect to the AddHeaderAndUplinkCommand() function. In TReK 3.x this function required two extra bytes for the checksum. TReK 5.x no longer requires those bytes. When the checkbox is checked, TReK will remove those two extra bytes to mimic the TReK 3.x behavior. This will also change the TReK 5.x behavior for the InsertDataAndUplinkCommand method of the CommandApi class. It should only be used if you are exclusively using the TReK 3.x compatible API.

Pad Non-String Variable Length Command Fields

If this checkbox is checked, variable length command fields that have a data type of "unspecified bytes" will be padded to word boundaries with the pad byte identified in the Pad Byte field if needed.

Pad Byte

This field is used to enter the pad byte to use when padding non-string variable length command fields. This must be a one byte hexadecimal value. This field will only accept hexadecimal entries.

Terminate String Command Fields

If this checkbox is checked, string command fields will be terminated with the terminator identified in the Terminator field if space is available.

Terminator

This field is used to enter the terminator to use when terminating string command fields. This must be a one byte hexadecimal value. This field will only accept hexadecimal entries.

## 6.7 Advanced Settings Dialog

The Advanced Settings dialog provides access to configure several advanced settings. The Advanced Settings dialog is shown in Figure 23.

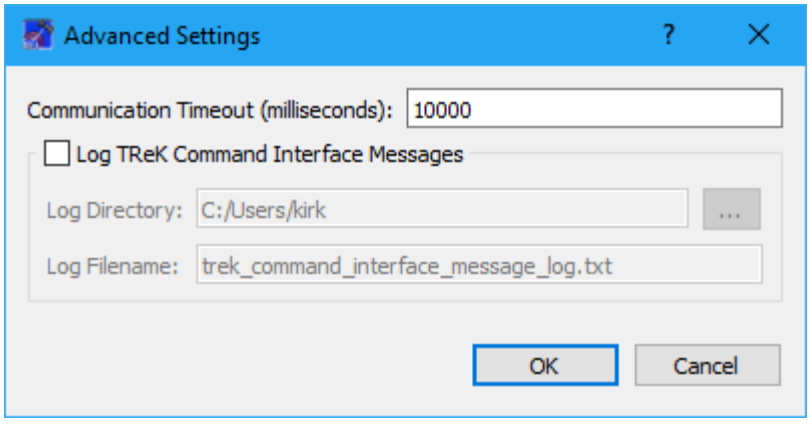


**Figure 23 Advanced Settings Dialog**

Communication Timeout

You can set the timeout value used in communication with the Huntsville Operations Support Center. It is unlikely there would ever be a need to modify this setting. The timeout value can only be modified when the Command service is inactive.

Log TReK Command Interface Messages

The TReK Command application provides the capability to log messages that are exchanged between the TReK Command application and the Destination to a file. This capability has been provided for troubleshooting purposes. Hopefully this is a feature you will never need to use. If you check the Log TReK Command Interface Messages checkbox, the messages that are exchanged between the TReK Command application and the Destination will be written to the log file specified. Message Logging will start when the Command service is activated and stop if you uncheck the box or the Command service is deactivated. Once a log file exists, any new messages will be appended to the existing log file.

Log Directory

The Log Directory field should contain the absolute path to the directory where the log file should be written.

Log Filename

The Log Filename field should contain the name to use for the log file.

### 6.8 POIC Connection Acknowledgement Dialog

The POIC Connection Acknowledgement Dialog is shown in Figure 24. This dialog displays information about the POIC Connection Acknowledgement. The Decrease Font and Increase Font buttons decrease and increase the font. The Fill Background checkbox will display color information by filling the background of the Value column.

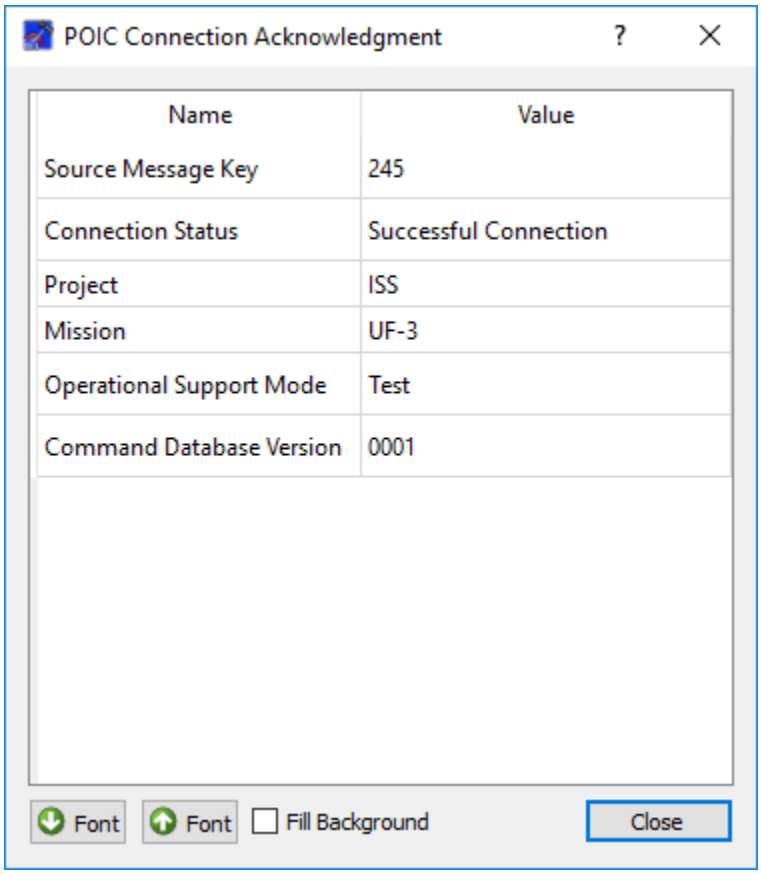


**Figure 24 POIC Connection Acknowledgement**

### 6.9 POIC Command System Configuration Dialog

The POIC Command System Configuration Dialog is shown in Figure 25. This dialog displays information about the POIC Command System Configuration. The Decrease Font and Increase Font buttons decrease and increase the font. The Fill Background checkbox will display color information by filling the background of the Value column.

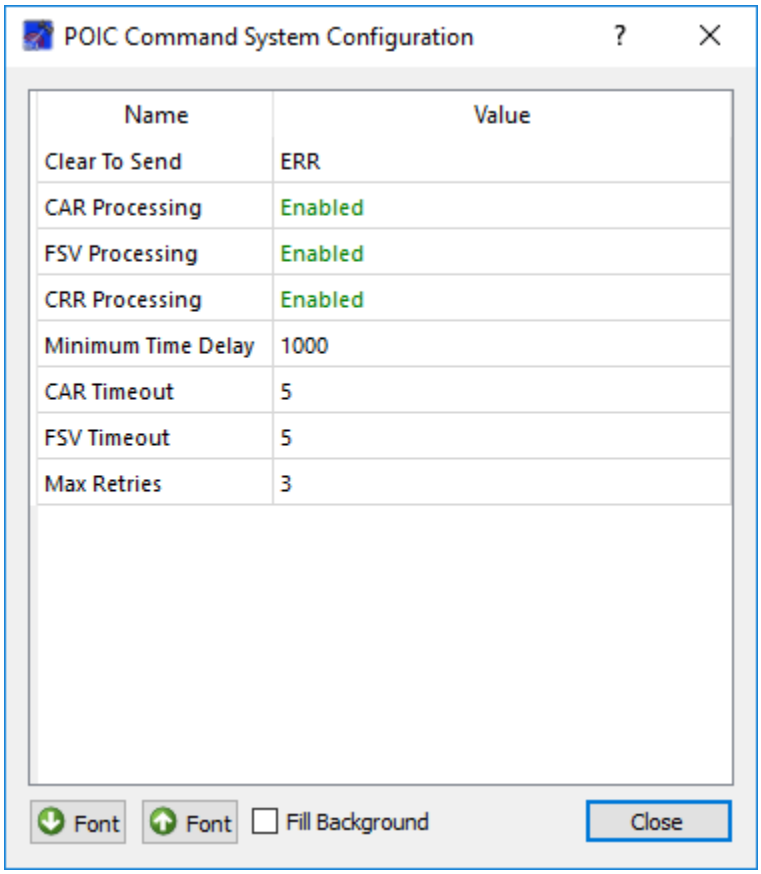


**Figure 25 POIC Command System Configuration**

### 6.10 POIC Command System Status Dialog

The POIC Command System Status Dialog is shown in Figure 26. This dialog displays information about the POIC Command System Status. The Decrease Font and Increase Font buttons decrease and increase the font. The Fill Background checkbox will display color information by filling the background of the Value column.

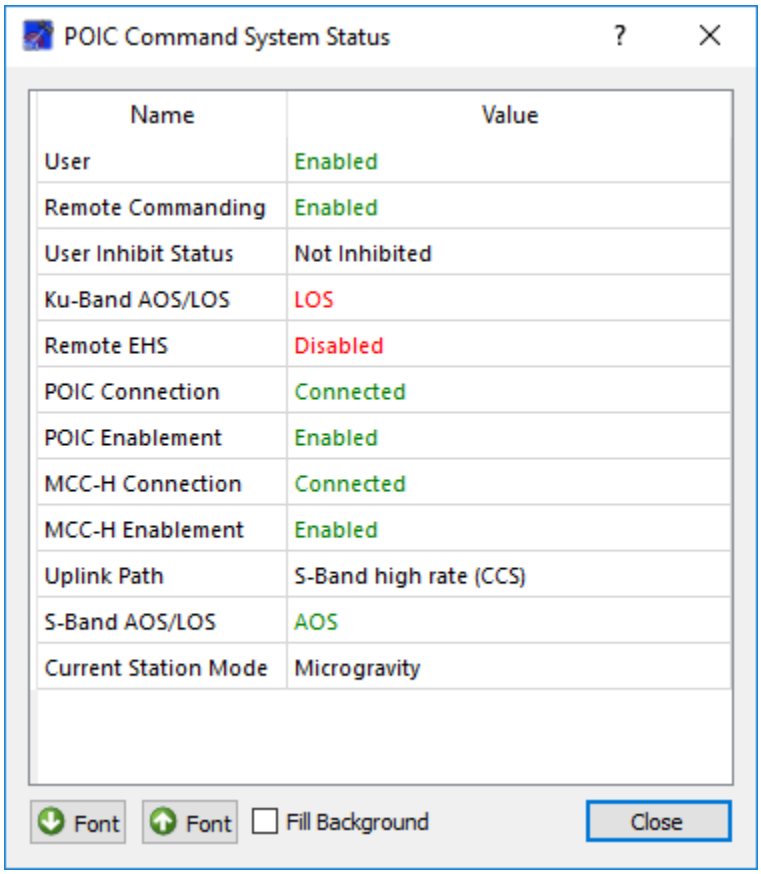


**Figure 26 POIC Command System Status**

## 6.11 Application Messages

Various types of application messages are generated including information, progress, warning, error, and debug messages. Information, warning, and error messages will be displayed in the main window message area. All application messages are sent to the Messages dialog shown in Figure 27. The Messages dialog can be configured to display specific types of messages. By default, the Messages dialog will display information, progress, warning, and error messages. Columns in the Messages dialog can be sorted by clicking on the column header. The Messages dialog is available from the Options menu.

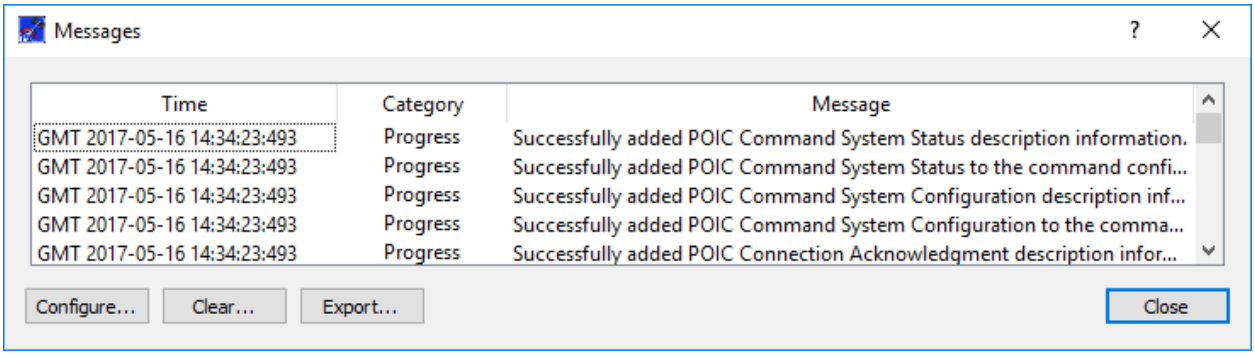


**Figure 27 Messages Dialog**

Configure

The Configure button provides access to the Configure Messages dialog shown in Figure 28. This dialog provides access to preferences associated with messages. Display preferences can be set to filter the types of messages (category) displayed in the Messages dialog. Export Preferences control how the time tag is added to the filename that is created when messages are exported. See the Export section for details.

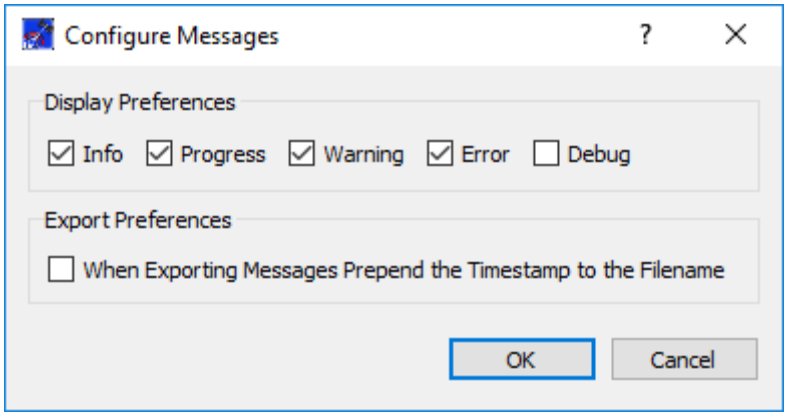


**Figure 28 Configure Messages Dialog**

Clear

The Clear button provides access to the Clear Messages dialog shown in Figure 29. This dialog provides two ways to clear messages in the Messages dialog. You can clear all the messages or clear selected messages. Once you clear messages, the messages are permanently deleted.

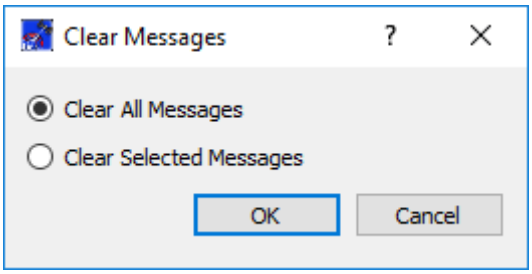


**Figure 29 Clear Messages Dialog**

Export

The Export button provides the capability to save all the application messages to a file. When you push the Export button you will be prompted for a directory and filename. Export will save all messages, not just the messages currently displayed in the Messages dialog (i.e. the Display Preferences are not applied). The name you provide for the file will be modified with a time tag that is added to the filename. The time tag indicates the time the file was closed. The default is to append the time tag to the filename. For example:

Filename Input: messages.txt
Filename Output: messages_2017-05-07_13~03~28.txt

If you would like to prepend the time tag to the filename you can set this preference in the Configure Messages dialog. This would result in the following:

Filename Input: messages.txt
Filename Output: 2017-05-07_13~03~28_messages.txt

## 6.12 Application Configuration File

The Command application saves the following information when you save a configuration:

- Configuration information in the Configure Dialog.

## 6.13 Application Settings

The Command application saves some settings as application settings each time you exit the application. The next time you run the application, the application will initialize with the previous application settings. Only one set of settings are saved. If you run multiple instances of the application, the settings in the instance that is exited last will be saved. The following application settings are saved:

- Application Window Size
- Command Preferences
- Configure Messages Selections

- Advanced Settings

# 7 FAQ and Troubleshooting

This section addresses Frequently Asked Questions and provides tips for troubleshooting common gotchas.

No FAQs Yet.